## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A device which produces a radioisotope from a target fluid irradiated with a beam of accelerated charged particles, the device including a circulation circuit, the circulation circuit comprising:

an irradiation cell which comprises a metallic insert;

a pump effective for generating flow of the target fluid and circulating the target fluid inside the circulation circuit;

an external heat exchanger; and

a pressurizing device which pressurizes the circulation circuit,

the pump and the external heat exchanger forming a cooling device external to the irradiation cell, the cooling device effective for cooling the target fluid and retaining the target fluid inside the cavity during irradiation a liquid state,

the metallic insert comprising a cavity which receives the target fluid, an inlet conduit and two outlet conduits which permit the inflow and outflow, respectively, of the target fluid into and out of the cavity as the target fluid moves in the circulation circuit,

an irradiation window which is substantially planar and positioned perpendicularly to the accelerated particle beam, the inlet conduit having a longitudinal central axis generally central to the insert and perpendicular to the substantially planar irradiation window, and the inlet configured to direct the target fluid inflow through the center of the insert and (1) perpendicular to the irradiation window and (2) to an impact point of the accelerated charged particle beam in the

irradiation window so that the inflow hits the window head-on with the beam, the outlet conduits to either side of the inlet conduit, each outlet having a cavity exit portion extending from the cavity, the cavity exit portion of each outlet conduit having a longitudinal central axis, each longitudinal central axis of the cavity exit portion of the outlet conduits intersecting the central longitudinal axis of the inlet and forming angles with the central longitudinal axis of the inlet and which angles cause a turbulent vortex in the flow of the target fluid inside the cavity.

2. (Previously Presented) The device according to claim 1, wherein the pump is configured to provide a flow rate sufficient to keep the target fluid at a mean temperature below 130° C.

3. (Previously Presented) The device according to claim 1 wherein the pump is configured to provide a flow rate greater than 200 ml/minute.

4. (Previously Presented) The device according to claim 3, wherein the pump is configured to provide a flow rate greater than 500 ml/minute.

5. (Previously Presented) The device according to claim 1, wherein the cavity is configured to contain a volume of target fluid of between 0.2 and 5.0 ml.

6. (Previously Presented) The device according to claim 1, wherein the overall volume of the target fluid in the circulation circuit is less than 20 ml.

7- 10. (Cancelled)

11. (Previously Presented) The device according to claim 1, wherein the cavity has a central axis around which a lateral surface is developed, the outlet being connected to the lateral surface and the inlet being along the central axis.

12. (Previously Presented) The device according to claim 1, wherein the irradiation cell further-comprises an internal cooling device effective for cooling the target material.

13. (Cancelled)

14. (Previously Presented) The device according to claim 12, wherein the internal cooling device provides indirect cooling of the cavity.

15–20. (Canceled)

21. (Previously Presented) A method for manufacturing a radiopharmaceutical compound, the method comprising utilizing the device according to claim 1.

22. (Previously Presented) The device according to claim 3, wherein the pump is configured to provide a flow rate greater than 1000 ml/minute.

23. (Currently Amended) A device which produces a radioisotope from a target fluid irradiated with a beam of accelerated charged particles, the device including a circulation circuit, the circulation circuit comprising:

an irradiation cell which comprises a metallic insert;

a pump effective for generating a flow of the target fluid and circulating the target fluid inside the circulation circuit;

an external heat exchanger; and

a pressurizing device which pressurizes the circulation circuit,

the pump and the external heat exchanger forming a cooling device which cools the target fluid to retain the target fluid inside the cavity during irradiation in the liquid state, and

the metallic insert comprising a cavity which receives the target fluid, an inlet and two outlet conduits which permit inflow and outflow, respectively, of the target fluid into and out of the cavity as the target fluid moves in the circulation circuit, an irradiation window which is substantially planar and positioned perpendicularly to the accelerated charged particle beam, the inlet conduit having a longitudinal central axis generally perpendicular to the substantially planar irradiation window, and the inlet conduit configured to direct the target fluid inflow (1) perpendicular to the irradiation window and (2) to an impact point of the accelerated charged particle beam in the irradiation window so that the inflow of the target fluid hits the window head-on with the beam, the outlet conduits on opposite sides of the inlet conduit, each outlet having a cavity exit portion that exits the cavity, the cavity exit portion of each outlet conduit having a longitudinal central axis intersecting the central longitudinal axis of the inlet and forming an angle with the longitudinal central axis of the inlet conduit, each angle between the central axis of the inlet conduit and the central axis of each of the outlet conduits less than 25° to cause a turbulent vortex in the flow of the target fluid inside the cavity.

24. (Previously Presented) The device according to claim 23, wherein the pump is configured and arranged to provide a flow rate sufficient to keep the target fluid at a mean temperature below 130° C.

25. (Previously Presented) The device according to claim 23, wherein the pump is configured and arranged to provide a flow rate greater than 500 ml/minute.

26- 30. (Cancelled)

31. (Previously Presented) The device according to claim 23, wherein the irradiation cell further comprises an internal cooling device effective for cooling the target material.

32. (Previously Presented) The device according to claim 1, wherein the cavity has a volume of at least 5 ml.

33. (Previously Presented) The method according to claim 21, wherein the cavity is configured to contain a volume of target fluid of between 0.2 and 5.0 ml.

34. (Previously Presented) The method according to claim 21, wherein the overall volume of the target fluid in the circulation circuit is less than 20ml.

35. (Previously Presented) The method according to claim 21, wherein the pump is configured and arranged to provide a flow rate sufficient to keep the target fluid at a mean temperature below 130°C.

36. (Previously Presented) The method according to claim 21, wherein the pump is configured and arranged to provide a flow rate greater than 500 ml/minute.

37. (Previously Presented) The method according to claim 21, wherein the pump is configured and arranged to provide a flow rate greater than 1000 ml/minute.

[[39]] 38. (Currently Amended) The device according to claim 1 wherein the internal cross section of one outlet conduit is larger than the other outlet conduit.

[[40]] 39. (Currently Amended) The device according to claim 23 wherein ~~the internal cross section of one outlet conduit is larger than the other conduit~~ the exit portion of one outlet conduit has an internal cross section and the exit portion of the other outlet conduit has an internal cross section and one internal cross section is larger than the other internal cross section.

40. (New) A device which produces a radioisotope from a target fluid irradiated with a beam of accelerated charged particles, the device including a circulation circuit, the circulation circuit comprising:

an irradiation cell which comprises a metallic insert;

a pump effective for generating flow of the target fluid and circulating the target fluid inside the circulation circuit;

an external heat exchanger; and

a pressurizing device which pressurizes the circulation circuit,

the pump and the external heat exchanger forming a cooling device external to the irradiation cell, the cooling device effective for cooling the target fluid and retaining the target fluid inside the cavity during irradiation a liquid state,

the metallic insert comprising a cavity which receives the target fluid, an inlet conduit and two outlet conduits which permit the inflow and outflow, respectively, of the target fluid into and out of the cavity as the target fluid moves in the circulation circuit,

an irradiation window which is substantially planar and positioned perpendicularly to the accelerated particle beam, the inlet conduit having a longitudinal central axis generally central to the insert and perpendicular to the substantially planar irradiation window, and the inlet configured to direct the target fluid inflow through the center of the insert and (1) perpendicular to the irradiation window and (2) to an impact point of the accelerated charged particle beam in the irradiation window so that the inflow hits the window head-on with the beam, the outlet conduits to either side of the inlet conduit, each outlet having a cavity exit portion that exits the cavity, the cavity exit portion of each outlet conduit having a longitudinal central axis, each longitudinal central axis of the cavity exit portion of the outlet conduits forming acute angles with the central longitudinal axis of the inlet and which acute angles cause a turbulent vortex in the flow of the target fluid inside the cavity.

41. (New) The device according to claim 40 wherein the exit portion of one outlet conduit has an internal cross section and the exit portion of the other outlet conduit has an internal cross section and one internal cross section is larger than the other internal cross section.

42. (New) The device according to claim 40, wherein the pump is configured and arranged to provide a flow rate sufficient to keep the target fluid at a mean temperature below 130° C.

43. (New) The device according to claim 40, wherein the pump is configured and arranged to provide a flow rate greater than 500 ml/minute.

44. (New) The device according to claim 40, wherein the irradiation cell further comprises an internal cooling device effective for cooling the target material.

45. (New) The device according to claim 40, wherein the cavity has a volume of at least 5 ml.

46. (New) The device according to claim 40, wherein the cavity is configured to contain a volume of target fluid of between 0.2 and 5.0 ml.

47. (New) The device according to claim 40, wherein the overall volume of the target fluid in the circulation circuit is less than 20 ml.